

Multiphasic Screening Project in an Indian School

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THE multiphasic screening program at Haskell Institute School Health Center was conducted in the fall of 1961 in order to examine as many students in as short a period of time as possible, with minimal loss of school time. The program was a cooperative enterprise in which Federal, State, and local groups successfully combined resources.

Haskell Institute, a federally operated school at Lawrence, Kans., offers a high school academic program and a 2-year postgraduate curriculum in commercial and other vocations for about 1,000 Indians and Eskimos. The students are between 14 and 25 years of age and come from approximately 85 tribes and 27 States. The Division of Indian Health of the Public Health Service provides health services through the school health center.

Procedures and Participating Agencies

The preliminary arrangements were initiated during the school year 1960-61. As the medical officer in charge of the Haskell School Health Center, I was responsible for planning and coordinating the program. The preparations entailed working with the various field offices of the Public Health Service, the State and county health departments, the principal of Haskell Institute, and the pathologist at the local hospital.

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The school arranged its program to insure a constant flow of students for screening during the 1-day period. It made the gymnasium available and provided students to act as clerks, guides, laboratory assistants, and cleanup detail.

The Douglas County Health Department provided a physician and a nurse to help in the testing program. The Kansas State Health Department contributed testing materials and personnel. Their health educator, who had wide experience in multiphasic screening, planned the use of space and helped coordinate the various activities. The State director of laboratories assisted with the testing and transportation of specimens. The staff of the chronic disease section of the Kansas State Health Department, including persons assigned from the Public Health Service, and the staff of the venereal disease section helped obtain and citrate blood specimens and perform blood sugar tests. The Communicable Disease Center, through the Kansas City Field Station, provided the histoplasmin and a medical officer to administer the histoplasmin skin tests and read the reactions. The Public Health Service Regional Office helped provide supplies and sent a staff member for observation and consultation. The Division of Indian Health supplied two nurses.

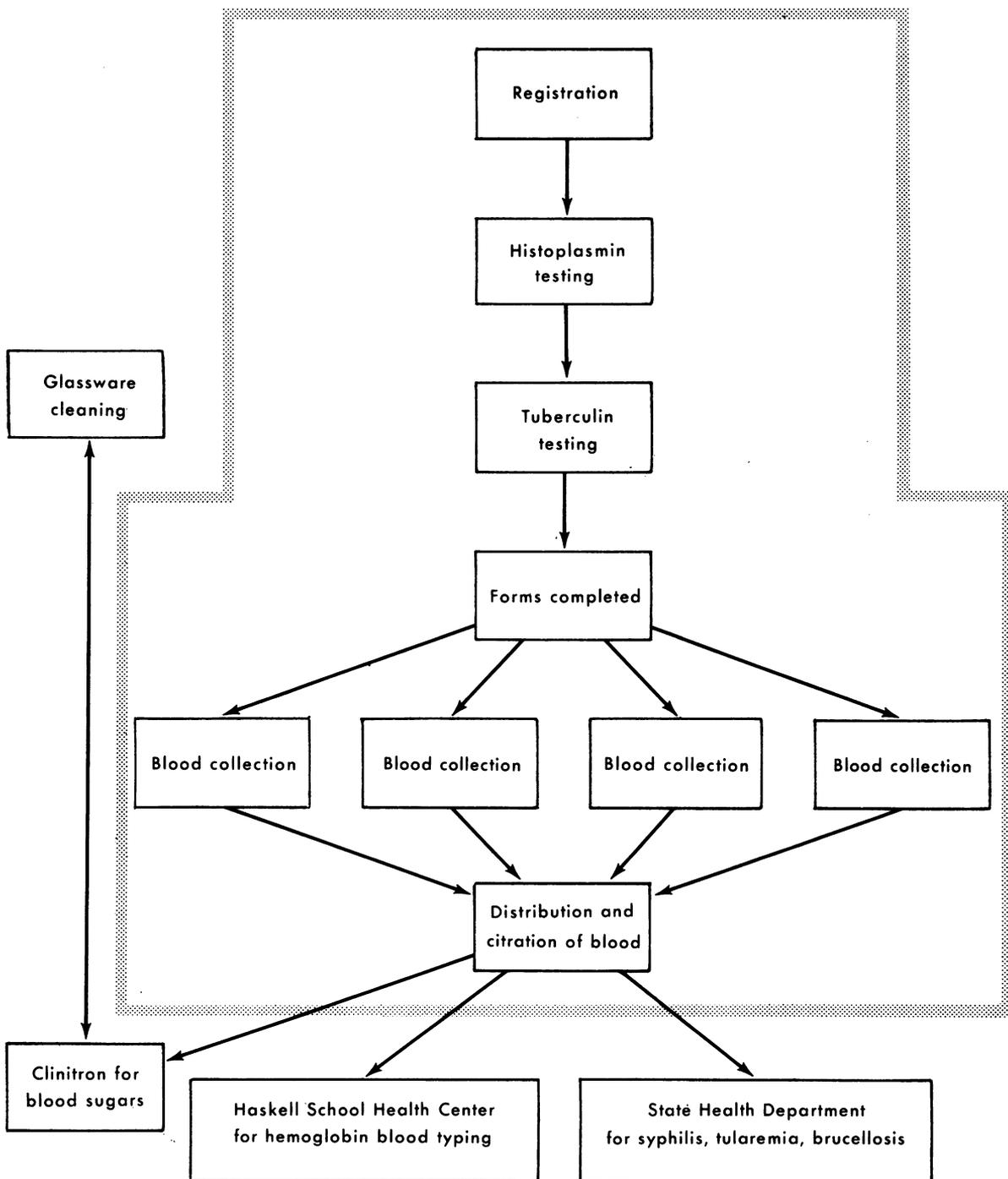
The students previously had been checked at the health center for vision, hearing, height, and weight. Before coming to the gymnasium for the testing, they had filled out epidemiologic forms for histoplasmosis. These forms were reviewed by registrars in the gymnasium for completeness and accuracy. Forms for re-

cluding tuberculin tests, serologic tests, blood sugar, and hematology were completed by the students in the gymnasium. The processing of the students is diagrammed in figure 1.

All students were given the intracutaneous

test for histoplasmosis. Tuberculin skin tests with intermediate strength PPD were given to only those students who did not have a positive Mantoux test of 10 mm. or more previously or a history of tuberculosis. Blood specimens were

Figure 1. Physical layout for multiphasic screening, Haskell Institute gymnasium



then taken to test for sugar, blood group, hemoglobin, syphilis, brucellosis, and tularemia.

The serologic tests were done by the Kansas State Health Laboratories; blood types and Rh factors were determined at the Haskell School Health Center laboratory; followup procedures that involved X-rays and tests such as glucose tolerance were done at Watkins Memorial Hospital and Lawrence Memorial Hospital. Reexaminations, tabulation, and recordings were completed by the Haskell School Health Center staff.

Selection of Tests

Histoplasmin tests were made for three basic reasons: (a) to determine in what areas of the country our students are exposed to the histoplasmosis organism; (b) to help in the differential diagnosis of chest and other pathology; (c) to help determine, with future testing, the possibility of infection of the students while they are at Haskell. Tuberculin testing was done because of the relatively high incidence of tuberculosis in the Indian population.

Blood sugar tests were performed because Indian health workers, including myself, have noted a high incidence of glycosuria among some Indian groups and also a relative infrequency of juvenile diabetes among Indians. The Wilkerson-Heftmann method with the cliniron was used in this test, with a level of 130 mg./100 ml. and over as positive on random specimens of venous blood. To get specimens from all the students required the whole day, and the students' eating habits were not altered; therefore, the time the specimens were taken was noted to correlate evaluated blood sugars with the food intake.

Tests for tularemia were done because many students come from rural areas and may have contracted the disease while hunting animals for food. Tests for brucellosis seemed indicated because many students have had frequent contact with domestic animals and unpasteurized milk.

Serologic tests for syphilis were performed because of the relative increase of syphilis among persons in their teens and early twenties in recent years. Out of about 500 tests on Haskell students in the preceding school year, 1960-61, there had been only one positive case

and that one had previously been treated as a case of congenital syphilis.

Blood typing was considered worthwhile because, in case of disaster, it would be of great advantage to each student to know his own blood type and to the community planners to know what blood types are available. Hemoglobin determination was considered because anemias appeared frequently in the students who visited the health center during the 1960-61 school year. Unfortunately, the tests were unreliable because too much hemolysis occurred.

Results

Blood types and Rh factor. Of 916 blood specimens obtained for typing, 26 were unsatisfactory for typing, and 2 were lost. The blood group distribution is shown in table 1.

While the screening information was primarily for the practical needs of the students, it is interesting to compare the frequency distribution of the blood types among the pre-Columbian stock with that among the dominant groups in the country. Matsen and Levine (1) in 1953 found that among full-blooded Chipewas, 93.6 percent were in group O and 6.4 percent in group A. Wintrobe (2) reported that 97.4 percent of Utah Indians were in group O and 2.6 percent in group A. From 20 years' experience in working with Indians, I have the impression that about 85 percent are in group O, with most of the remainder in group A. The degree of racial influence on the distribution of blood types is difficult to assess because of intermarriage, migration, and wars.

The findings on the Haskell group indicate that the distribution of blood types among American Indians may be approaching that of

Table 1. Blood type distribution of 888 Haskell Institute students, by sex

Blood type	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
O.....	580	65.3	307	68.2	273	62.3
A.....	258	29.1	113	24.2	145	33.1
B.....	43	4.8	26	5.8	17	3.9
AB.....	7	.8	4	.7	3	.7

the European stock (fig. 2). The distribution among the students is 65.3 percent group O, 29.1 percent group A, 4.8 percent group B, and 0.8 percent group AB, compared with 45 percent group O, 42 percent group A, 10 percent group B, and 3 percent group AB among the European stock as described by Best and Taylor (3). The distribution of blood types at Haskell has probably been influenced by groups such as the Blackfeet Indians. Mourant (4) reports that up to 80 percent of the Blackfeet are in group A. Of the Haskell students from the Blackfeet tribe, 20 out of the 27, or 74 percent, were type A.

Because the staff was small, the Rh factor was determined only for female students. Of 435 students, 428 were Rh positive and 7 Rh negative. All students with negative Rh factors had some European blood. Best and Taylor (3) give the distribution of anti-D reactors in European stock as 85 percent; the distribution was 98.4 percent among the Haskell students.

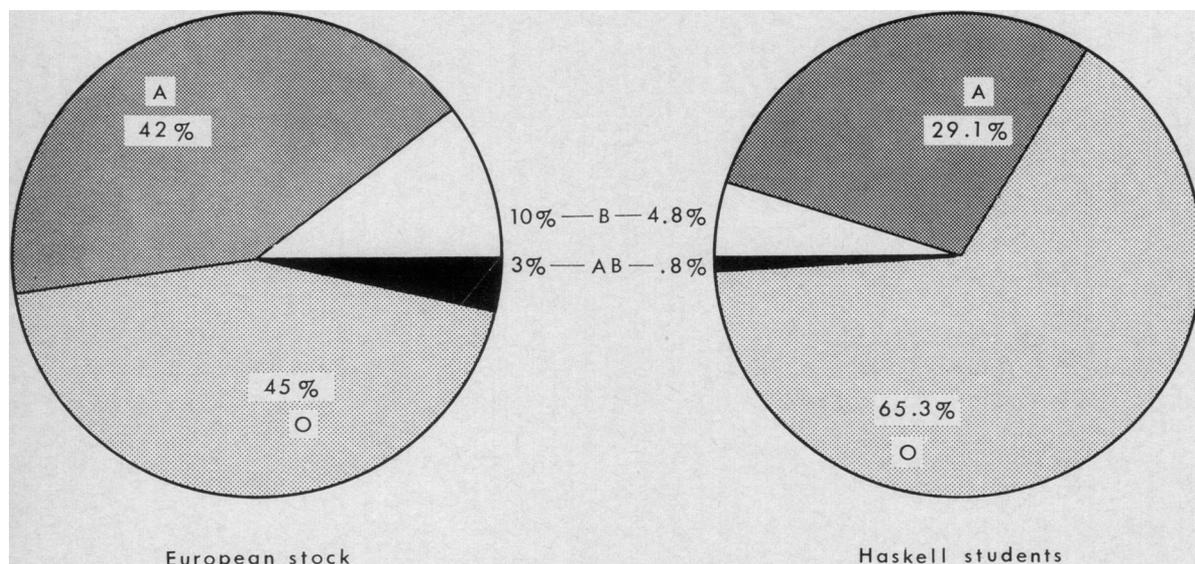
Syphilis. Specimens of venous blood from 920 students were examined for syphilis at the Kansas State Health Department Laboratories. Of the five positive specimens, two were from previously known patients who had received adequate treatment; two were found to be false positives; and the one new positive case that was found was treated. The contacts are being investigated.

In my previous experience with an adult Indian population, usually about 3 to 6 percent tested positive, with nearly all cases in the latent stage. In a multiple screening project in 1961 by the North Dakota State Health Department and the Public Health Service on the Standing Rock Indian Reservation, 260 Indians in the 15-24 age group were tested for syphilis, and 7, or 2.6 percent, were reported positive. In the Haskell screening, 0.5 percent were reactors and only 0.3 percent were true positives.

Diabetes. Of 920 venous blood specimens screened for sugar level, 19 positives were reported. The 19 students were further investigated with glucose tolerance tests which revealed pathological curves for five students. One of them was a known diabetic and two others gave definite findings indicating diabetes. In a comparable number of routine urine examinations for glucose, not one case of diabetes was discovered.

In the diabetes screening of 142 Indians between the ages of 15 and 24 on Standing Rock Indian Reservation, no positive tests were reported. A number of other diabetes screening projects on Indian Reservations have been reported to the Public Health Service. On the Pine Ridge Reservation in South Dakota in 1960, of 660 persons who were tested 90 percent or more were Indian, and 13 were found posi-

Figure 2. Distribution of blood types



tive at 160 mg. level; 5 were new cases. This survey was not limited to the younger age group. At the Menominee Reservation in Wisconsin, of 307 Indians tested in 1961 by the Wilkerson-Heftmann method using a 160 mg. level, 18 were found positive; 7 of these were new cases. The Papago Indian Survey in Arizona in April 1961, which tested 258 persons of all races, found 10 positives; 7 of these were new cases. At the Salt River Reservation (Pima Indians), also in Arizona, 141 persons were tested, all ages and races; 8 were found positive. Six of these were new cases. In my own experience among the Papago and Pima Indians, I have found a high incidence of glycosuria.

Tuberculosis. To determine the tuberculin sensitivity of the school population, 621 students whose reactions so far as the examiners knew were previously negative or untested were given intracutaneous injections of 0.1 cc. of intermediate strength PPD tuberculin. Examination 48 hours later found 102, or 16 percent, had an induration of more than 5 mm. Fifteen of the reactors were known to be converters. Including all previously known reactors, the total rate for the school is 43 percent. The distribution by sex of the reactors is shown in table 2.

Table 2. Distribution of tuberculin reactors by sex, Haskell Institute

Reaction	Males	Females	Total
Negative.....	229	290	519
Positive.....	226	158	384
Determined in 1961 screening.....	58	44	102
Previously known.....	168	144	282

The percentage of reactors is highly weighted by the 105 Alaskan students, 85 of whom are reactors. If this group were omitted, the total percentage of reactors in the school would be reduced from 43 percent to 36 percent, which is still very high in comparison with the rest of the country.

The reactors were X-rayed using 14-inch by 17-inch film, and no active cases of pulmonary tuberculosis were found. In 1961 a test of 120 students in the Lawrence community disclosed 3 tuberculin reactors, a ratio which has been

maintained year after year, according to the Lawrence health officer.

The multiphasic screening on Standing Rock Reservation reported that 56.4 percent of the tuberculin tests were positive. In the future, it may be of value to retest the nonreactors at Haskell for possible conversion since four active cases of tuberculosis were found during the preceding school year.

Because of the possible effects of new drugs, surgery, and epidemiologic activities which have become available in recent years through the Public Health Service, it will be interesting to compare the tuberculin reactor rate of this student group with the reactor rate of students a few years from now.

Histoplasmin sensitivity. Of 910 students injected intradermally with 0.1 cc. of histoplasmin (HKG5), 218, or 23 percent, had indurations of 5 mm. or more and were considered positive reactors. A breakdown of the reactors by area of residence is planned. In 1946, the testing of Lawrence residents in a comparable age group by Bunnell and Furcolow (5) found that approximately 62 percent were positive. In a rural community in Minnesota in 1954, 11.3 percent were reported positive in the 15-18 age group (6). It will be interesting to see how many converters are found among Haskell students when those with negative tests are retested.

Tularemia and brucellosis. Examination of the blood specimens for tularemia revealed 918 negatives and 2 positives to dilutions of 1:20 and 2 positives to dilutions of 1:40. Brucellosis flocculation tests gave 892 negative results. Fifteen specimens were positive to 1:20 dilutions. At present, tularemia and brucellosis do not appear to be significant problems for Haskell students.

Conclusions

The cooperative action of Federal, State, and local agencies in a multiphasic screening project made available many services to Haskell Institute students which the school health center alone could not provide. In a large school, health screening done early in the school year can point to many needs that otherwise might be unmet or discovered only late in the year when close followup may be difficult.

The distribution of blood types and the rates for tuberculin sensitivity (43 percent) and histoplasmin sensitivity (23 percent) were established, and one new case of syphilis and two new cases of diabetes were found. An additional benefit was the valuable health education experience gained by the students.

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Field Tests of New Antimalarial Drug

Field testing of the new long-acting antimalarial drug C1501 will begin in Pakistan probably early in 1964. On a recent visit to Pakistan, Dr. G. Robert Coatney, chief of the Laboratory of Parasite Chemotherapy, National Institute of Allergy and Infectious Diseases, completed testing arrangements with Dr. M. K. Afridi, consultant on malaria to the Pakistani government, and with representatives of the University of Maryland's International Center for Medical Research and Training, whose facilities in Lahore, Pakistan, will be used for the approximately 30-month field trial.

A single injection of the new drug continued to protect volunteers nearly a year later even though they were bitten by heavily infected mosquitoes at monthly intervals, according to initial results of testing reported by Dr. Coatney at the annual meeting of the American Society of Tropical Medicine and Hygiene in November 1962. Volunteers not given the drug who were bitten by the same mosquitoes "invariably came down with malaria."

Dr. Coatney also visited the Laboratory of Parasite Chemotherapy's Far East Research Project in Kuala Lumpur, Malaya, which is investigating the possibility of the existence of a monkey-mosquito-man cycle of malaria in nature (already demonstrated in the laboratory).